CHICAGO NEUROLOGICAL SOCIETY.

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The Vice-President, Dr. Hugh T. Patrick, in the chair.

POLIOENCEPHALITIS SUPERIOR IN A MAN THIRTY-ONE YEARS OF AGE.

This case was reported by Dr. Church. The patient had been married five years, but had no children. Cashier by occupation. Family history presented several cases of tuberculosis, otherwise it was negative. The personal history of the patient was also without notable incident and venereal history was denied. For several years, however, he had used alcohol and tobacco freely, working very hard, with short hours of sleep but considerable outdoor athletic exercise.

August 19, 1899, in a very hot sun, he played golf all day without head covering. Forehead, face and scalp severely burned and the hair bleached by the sun. On the second day thereafter he noticed dimness of vision in both eyes, was compelled to hold the book at a distance, and there was also a little double vision. Examination of the eyes by competent oculists failed to detect any trouble in the fundus. There was, however, a tendency to outward squint and some rigidity of the pupils. He was given mercury by inunctions.

Two weeks later he came under observation, showing a slight ptosis on the left side, outward deviation of both eyes, pupils rigid to light and accommodation. Headache, vomiting, dizziness and other subjective disturbances absent. Temperature, pulse, respiration, urine and blood normal. He showed a little tendency to oversleep and during the day would drop asleep while driving. He seemed to be indifferent to subjects of ordinary interests and to the gravity of his condition. After 20 daily inunctions the gums were slightly affected and the mercury discontinued.

On the 30th day after the onset of symptoms his speech was a little muffled and there was some inco-ordination when walking with the eyes closed. The tendon reflexes which previously had been normal, became increased and there was a slight ankle-clonus on each side. During the night he had had involuntary urination.

On the 31st day the divergent squint subsided, apparently through paresis of the external rectus or involvement of the nuclei of the 6th nerve, and the pupils commenced to dilate. Vision for distance was still normal but there was no accommodative action and the pupils responded neither to light nor accommodation. Static ataxia was decidedly pronounced. The temperature had a slight subnormal tendency. There was mental hebetude.

On the 32nd day he was unable to stand, pupils were dilated *ad maximum*, the eyes perfectly immobile, ptosis on both sides partially developed. Temperature commencing to ascend, reached 100.2. The next day double ptosis was complete, reflex excitability was greatly increased so that the patient was almost tetanized as he lay apathetically in bed. Babinski's reflex was present on each side. Temperature 101.2, pulse 120. Next day his condition was worse; he had some difficulty in swallowing. Coma existed most of the day. The following day temperature rapidly ascended to 108, with a falling pulse at the same time and he died after twenty-four hours of absolute coma.

Post-mortem examination was absolutely negative, except healed foci of tuberculosis in each apex about as large as a walnut.

Examination of specimens and serial sections made by Dr. Futterer show areas of more or less well-outlined softening in the corpora quadrigemina, pons, peduncles, internal and external capsule, principally upon the right side. The area in the external capsule involves the claustrum in its anterior portion with an upward extension to the lower level of the cortex. The lesions in the peduncles are confined to their lower parts and are small, while others involve the nuclei of the oculomotorius, trochlearis and abducens. Changes are decidedly inflammatory and blood vessels thickly surrounded by masses of leucocytes appear in the midst of areas of degeneration. Here and there is also well developed hyaline degeneration of the walls of the blood vessels.

Dr. Church called attention to the fact that a series of cases showing gradations between acute polioencephalitis and asthenic bulbar paralysis or myasthenia gravis could be found in the literature, and that in this case the sequence of events might perhaps be considered as follows: A tubercular lesion inducing some hyaline degeneration in the vessels, subsequently traumatism in the shape of sunburn, the action of toxic or infectious agencies producing inflammatory changes in the area of lowered resistance, and polioencephalitis with additional foci of inflammatory disturbance.

Dr. Church suggested the possibility of a series of pathological conditions in which polioencephalitis formed one end and myasthenia gravis the other. Dr. Sanger Brown thought that this could hardly be the case as the tendency of myasthenia gravis is towards recovery. Dr. Patrick agreed with Dr. Church and showed sections from a case which apparently occupied middle ground between the two conditions mentioned. Dr. Patrick's sections through various areas of the cerebro-spinal axis showed everywhere vast engorgement of the capillaries and possibly some early degeneration of cells, the patient having died before further destruction had taken place.

A SIUDY IN THE HEMATOLOGY OF NEURASTHENIA.

Dr. Lodor said that the title neurasthenia would seem to cover a pathological condition far more widespread than the term itself might indicate. There is scarcely an organ or tissue in the body which does not show more or less deviation from the normal.

In taking up its hematology, facts appear which of themselves are confusing and contradictory. One of the first symptoms noticeable in neurasthenia is the evident anemia, or if not anemia, hemic change. In an able and suggestive article published in the *Medical Record*, June 25, 1898, Mary Putnam Jacobi points out that many neurasthenics and also patients evidently anemic, have a very high blood count, and gives the history and count of several patients where the reds were over 5,500,000. One patient, a palid neurasthenic, had a red count of 6,660,000; whites, 37,777. Following suggestions of S. Weir Mitchell, Dr. J. K. Mitchell has made a very careful and exhaustive study of many neurasthenics, finding a large per cent. of them evidently anemic and yet with a blood count either normal or supranormal. Such observers as Mitchell, Oliver, Cabot, Cheron Vigoroux, have noticed and noted the changeableness of the red count owing to variation in the condition of the blood-drop after massage, static electricity, etc.

It is curious that it never occurred to these careful observers to put together the results obtained by the various means of blood examination. No tissue of the body is so changeable or so changing, as the blood, and before any fair conclusions can be drawn certain facts of its condition must be obtained, as:

(1) Its specific gravity.

(2) Chemical composition.

(3) Rate of flow and caliber of vessels, including vasomotor control, as the red and white corpuscles do not move with the same velocity, the white tending to lag and stick against the blood vessel wall.

(4) Temperature of the part furnishing blood for examination.

(5) Number of reds and number of whites.

(6) Hemoglobin value in color.

(7) Bulk value of corpuscular elements as determined by the hematokrit.

(8) Biochemical activity of cell as manifested by its ability to take up acid or alkaline staining reagents.

(9) The age of the corpuscular elements, a point not practically discoverable clinically, but bearing largely upon the condition of the patient, and possibly discoverable by *a priori* reasoning.

(10) Its bacteriology.

In experimental work done by Drs. John Holdan and J. Lorrain Smith, *Jour. of Phys.*, 1894, p. 465, to determine the different oxygen capacities of red blood corpucles, several data were obtained which aid in discovering the age of corpuscles. When blood is centrifugated, the heaviest corpuscles naturally are thrown to the periphery. These observers took specimens from this heavy outer layer of corpuscles and found that they had an increase of 20 per cent. of oxygen carrying capacity over the layer near the center of centrifugation. Size of corpuscles, according to their statements, in no way influenced oxygen carrying capacity. A still more interesting point was the fact that blood drawn from animals previously bled, had a higher oxygen capacity than that obtained before such bleeding. While such facts were noted, the evident conclusion was not drawn, namely, that the heavy corpuscles were the new ones and the light corpuscles with enfeebled oxygen carrying capacity, were old.

Premising so much, Dr. Lodor spoke of observations made first, in the examination of choreics and afterward carried on in neurasthenics. Patients coming into the examining room from an outside temperature below freezing, showed for some time a marked decrease in the solid constituents of the blood amounting not infrequently, to 10 per cent. by bulk as shown by the hematokrit over readings obtained in former examination, not only this but apparently an increase in the proportion of reds over whites. When the patient was thoroughly warmed this discrepancy disappeared. Patients examined after Franklinization showed a decided increase in bulk of solids and number of reds over readings obtained before the electricity was used. Immersing the hand of a well warmed patient into cold water rapidly lowered the bulk of reds in circulation. From many examinations made, both in health and disease, it was found that cold uniformly lowered the bulk of solids in peripheral blood and increased the apparent quantity of reds over whites. On the other hand, warmth restored the balance and massage and electricity uniformly raised the bulk of solids above normal for the individual, thus giving a sway from the abscissa line of normal, to from 2 to 10 per cent. below to 2 to 10 per cent. above. A natural deduction would be that some attention should be given and allowance made in the blood count in patients with cold, clammy hands and extremities. The small size of blood vessels and the vaso-motor constriction seen in some neurasthenics may account for part of the apparent hemic disturbance. Furthermore, change of atmospheric pressure materially changes the number of reds as might be expected. A marked increase in the quantity of solids in the blood from a finger was always obtained by rotating the arm rapidly. Removal of a patient to an altitude causes reds to appear in greater number in peripheral vessels, so that the remarkable gain noted at times in the hemic condition of patients taken to altitudes may be, and probably is, factitious, due to the altitude and not to an actual increase in the number of reds in the general circuit.

Going back to the study of the red blood column as shown in the hematokrit and studying it more in detail, there seem to be three areas in it, in normal blood: a heavy area found at the periphery, a middle weight area in the center, and a lighter weight area at the proximal end of the clot.

Dr. Lodor found that blood taken from these three areas varies much in its capacity to take up acid stains. The heavy blood from the periphery stains deeply and quickly and evenly with the acid stains: The middle area stains fairly well with acid stains, and blood from the proximal end of the tube but slightly. There are certain other features of the blood from this last area which attract attention. The corpuscle itself is exceedingly lean, oftentimes almost dumb-bell shaped when on edge, and does not stain evenly. The cytoplasm is apparently pushed to an outside rim with cell wall collapsed and touching in the center, the cell contents having lost almost all biochemic activity.

Putting the findings together, namely, that in normal blood we have circulating red cells of very uneven value, and that some of them are heavy and stain well, that in an animal bled and allowed to recuperate we have a great preponderance of heavy red cells staining deeply, and that in both instances the heavy cells have a greater oxygen carrying capacity, the conclusion would seem inevitable that these heavy cells are new or recently formed.

Applying these facts, and conclusions legitimately drawn from these facts, to findings in the examination of the blood of neurasthenics, it would appear possible to reconcile many statements apparently diametrically opposed. In all cases coming under Dr. Lodor's observation, there seems to be some hemic disturbance, no matter whether the case has as a basis, an auto-toxemia, a toxemia as a sequel of preceding disease, or is apparently purely acquired or is of distinctly hereditary type. Each type may have some particularly prominent symptom, a sexual one, or gastric one, but be the type or special symptom what it may, if the disease persists any length of time there presently appears a condition of blood fairly constant and typical of the disease. The reds may or may not be reduced in count, at times may be even above count, but the individual erythrocyte has undergone a change so that it resembles the cells in normal blood, which Dr. Lodor has called for want of a better name—old cells. In many cells the cytoplasm in stained specimens seems pushed out to the periphery to such an extent that the cell becomes dumb-bell shaped instead of the normal lenticular or biscuit shape. As a result the cells pack together closely and show a marked diminution in volume by the hematokrit. The oxygen carrying capacity is lowered and in consequence the hemoglobin is deficient in color test. The blood in neurasthenia would seem to be poor in oxygen carrying capacity, and not only this but owing to the poor vaso-motor control the peripheral blood at least varies much in its character. Time and again Dr. Lodor has noticed the blood issuing from a puncture not well mixed, so that serum came first and then, apparently, a mass of corpuscles. Such findings lead at once to speculation. Certainly many cases of neurasthenia have some form of toxemia as an underlying cause. The value of all means of hemogenesis is at once apparent and if it were necessary, further proof is furnished for the value of massage, electricity and over-feeding.

Dr. Patrick wished to know what form of static current was used in the experimentation, the reply indicating that any form which produced skin irritation, but particularly the short spark, would produce the conditions as indicated. Dr. Dewey thought that any form of rubefaction would cause similar conditions to those mentioned in the paper. Dr. Sanger Brown extended the thanks of the society to the writer for original work done and said that while nothing new in the way of treatment was claimed, certain pathological conditions were happily explained.